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1. "IMPROVEMENTS IN A MODULAR FRUIT JUICE
EXTRACTION SYSTEM," an invention composed of two fixed
peeler cups (3) attached to a structural chassis (1) and
two matching moveable peeler cups (4), one pair of fixed
5 and moveable peeler cups (3) and (4), each pair located
at opposite ends of the machine, where the moveable
peelers cups (4) are each attached to opposite ends of a
single linear actuator (2), which can employ various
drive technologies, including hydraulic, pneumatic,
10 electric, geared, screw and/or any combination of known
linear drive systems that, in a back and forth cycle,
drives both movable peeler cups (4). The system is
composed of a moveable peeler cup (4) at each of the
extreme ends of the linear actuator (2), driven in a
15 manner that maximizes the productivity of the drive
motion, since when one peeler cup (4) is opening to allow
a fruit (19) to fall within its concave and radially cut
chamber, formed in conjunction with its matching pair
fixed peeler cup (3), at the same time the moveable
20 peeler cup (4) at the opposite end of linear actuator (2)
is closing upon the fruit (19) inside the chamber formed
by the intermeshing of peeler cups (3) and (4), and
shearing the fruit's skin (12) as it initiates the

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peeling process and continues on to complete the juicing cycle by pumping the fruit's core (13) into the filtering device (7) and, since this filtering device has a circular sharp cutting point at its forward opening, it permits the fruit's core (13) to enter completely into the filter (7), which has radially cuts slits which allow for the extracted juice (11) to flow through and be collected in the space formed by the inside of the fixed peeler cup (3) and the juice collector (10), followed by the motion of plunger (8) which travels through the filter and pushes directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of these byproducts being produced: juice (11), peel (12) and core (13), can now be separately directed to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4)

at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

2. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a first version in which in the final stages of the extraction cycle, as the moveable peeler cups (4) move back and away from the fixed peeler cups (3), linear actuators (16) drive the pull rods (15), which in turn are attached to a transverse cross member (9) to which the plunger (8) is firmly fixed, thus drive said plunger (8) to travel through the filter and push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed separately to other stages of processing. With the moveable peeler cup (4) in

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the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the geometry and configuration is symmetrical as shown, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

3. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a second version in which in the final stages of the extraction cycle, driven by the action of linear actuator (2), the moveable peeler cup

(4) moves back and away from the fixed peeler cup (3), and since it is solidly fixed to a transverse cross member (20), causes the simultaneously driving of said cross member (20), which in turn is attached through the pull rods (15) to another transverse cross member (9) at the opposite end, to which plunger (8) is firmly fixed, thus driving said plunger (8) to travel through the filter and push directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter (7) and, finally, the dried fruit core (13) falls into and through the chamber formed by the fixed (3) and moveable (4) peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed separately to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the geometry and configuration is symmetrical as shown, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the

machine, or, at either pair of peeler cups, the juice extraction cycle is exactly identical. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle.

5 Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4),
10 the juice extraction cycle is exactly identical.

4. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a third version (NOT SHOWN)
15 comprehended by yet another manner of driving the plunger (8). By placing a linear actuator fixed directly to structural chassis (1) and attaching the driving end of said actuator to plunger (8), actuation will drive said plunger (8) to travel through the filter and push
20 directly on the fruit's core (13) until said core is expelled completely from the forward end of the filter and, finally, the dried fruit core falls into and through the chamber formed by the fixed (3) and moveable (4)

peeler cups, and is directed to further fall through the fruit core receiving duct (14), in a manner so that all of the byproducts being produced: juice (11), peel (12) and core (13), can now be directed respectively to other stages of processing. With the moveable peeler cup (4) in the full open position, the machine is ready to commence another fruit juice extraction cycle. Since the configuration is symmetrical as shown in Figures 1 through 5, the pair of peeler cups (3) and (4) at one end of the machine will be exactly 180 degrees out of phase with respect to the pair of peeler cups at the opposite end of said machine. At either end of the machine, or, at either pair of peeler cups (3) and (4), the juice extraction cycle is exactly identical.

5. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by including, in all configurations and versions, clean-in-place spray nozzles (21) mounted at different positions on structural chassis (1), in a manner such that, liquid and/or vaporized sprays can be utilized automatically, controlled by computer or other methods, for automatic cleaning of the machine at predetermined time periods as deemed

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necessary.

6. "IMPROVEMENTS IN A MODULAR FRUIT JUICE EXTRACTION SYSTEM," an invention configured as described in CLAIM 1, characterized by a basic module which contains two pairs of peeler cups (3) and (4), each pair located at opposite and symmetrical ends of the machine as shown in FIGURES 1 through 5, and thus as a basic module, can be arranged on a multiple basis, in a parallel or other manner, allowing for an initial single module to be used and permitting that, over time, many more modules can be installed in juice production facilities, permitting flexible and economic growth of one's juice production plant and assuring the advantages of quality and organoleptic benefits of the juice extracted by this technology, independently of the size of the production capabilities.

7. A fruit juice extraction apparatus comprising: two fixed peeler cups and two moveable peeler cups attached to a chassis in mating pairs of fixed and moveable peeler cups, said cups being concave hemispheres, each pair being located at opposing ends of said chassis, where said moveable peeler cups are each attached to opposing ends of a single linear drive

actuator for driving both movable peeler cups in a back and forth cycle, said moveable peeler cup at each of the ends of said linear actuator being driven in a manner such that when one of said peeler cups is opening to
5 allow an article of fruit to fall within its concave chamber formed in conjunction with its mating fixed peeler cup, said moveable peeler cup at the opposing end of said linear actuator is closing upon said fruit inside said chamber formed by the intermeshing of said moveable
10 and fixed peeler cups, and shearing said fruit's skin as it initiates the peeling process and continues to complete the juicing cycle by pumping said fruit's core through a filtering means mounted in said mating fixed peeler cup, said filtering means having a cutting point
15 at its forward opening and radially cut slits to permit said fruit's core to enter completely into said filtering means which allows for the extracted juice to flow through and be collected in juice collection means connected to said fixed peeler cup, followed by the
20 motion of a plunger which travels through said filtering means and pushes directly on said fruit's core until said core is expelled completely from the forward end of said filtering means and, whereby, the dried fruit core of

said fruit falls into and through the chamber formed by said fixed and moveable peeler cups, and is directed to further fall through a fruit core receiving means, whereby when said moveable peeler cup is in the full open position, said apparatus is positioned to commence another fruit juice extraction cycle.

8. The apparatus of CLAIM 7, wherein said pair of peeler cups positioned at one end of said apparatus are 180 degrees out of phase with respect to said pair of peeler cups at the opposing end of said apparatus.

9. The apparatus of CLAIM 7, wherein when said moveable peeler cups move back and away from said fixed peeler cups, said linear drive actuator drives said plunger through said filtering means, whereby said fruit's core is expelled completely from the forward end of said filtering means and the dried fruit core falls into and through said chamber formed by said fixed and moveable peeler cups.

10. The apparatus of CLAIM 7, further comprising spray nozzles mounted at selected positions on said chassis.

11. A fruit juice extraction apparatus comprising:
a chassis having mounted thereon juice

extraction means;

said juice extraction means having means for storing said fruit, said storing means having a plurality of apertures therein for allowing articles of said fruit to be deposited between at least two pairs of mating concave hemispheres, each of said pairs having one movable and one fixed hemisphere;

drive means for actuating means for forcing each of the movable of said concave hemispheres against its mating fixed concave hemisphere, thereby pressing an article of said fruit deposited between said hemispheres;

each of said movable concave hemispheres having a central pin and each of said fixed concave hemispheres having a perforating tube for the extraction of juice from said article of fruit, whereby the solid residue is deposited in a receptacle and the liquid is passed through a filter and then falls into a reservoir which has outlet ports therein.

12. The apparatus of CLAIM 11, wherein said perforating tube has multiple transverse slits of increasing diameter from inside to outside.

13. The apparatus of CLAIM 11, wherein each of said concave hemispheres having its concave surface defined by

a plurality of spaced-apart radial blades.

14. The apparatus of CLAIM 13, wherein said radial blades of each of said hemispheres are of at least two different lengths.

5 15. The apparatus of CLAIM 14, wherein when said movable hemisphere is forced against its mating fixed hemisphere, said radial blades of said movable hemisphere are positioned intermediate said radial blades of said fixed hemisphere.

10 16. The apparatus of CLAIM 11, wherein said movable hemispheres are attached to opposing ends of said forcing means for driving both movable hemispheres in a back and forth cycle, said moveable hemispheres at each of the ends of said forcing means being driven in a manner such
15 that when one of said movable hemispheres is opening to allow said article of fruit to fall between it and its mating fixed hemisphere, said moveable hemisphere at the opposing end of said forcing means is closing upon said fruit between it and said other of said fixed hemispheres
20 and shearing said fruit's skin as it initiates the peeling process and continues to complete the juicing cycle by forcing said fruit's core through its said perforating tube, whereby extracted juice flows to said

reservoir.

17. The apparatus of CLAIM 16, further comprising a plunger which moves through each of said tubes and expels said fruit's core from the forward end of said tubes and, whereby when one of said moveable hemispheres is in the full open position, said apparatus is positioned to commence another fruit juice extraction cycle.

18. "IMPROVED CONFIGURATION FOR A SELF-CLEANING FILTER WITH REMOVABLE PERFORATING POINT FOR THE EXTRACTION OF FRUIT JUICE," consisting of a cylindrical filter body (1) constructed of stainless steel or other food grade, nontoxic materials, where at one extreme end a removable cylindrical perforating cutting edge (2) is attached, by threads or other methods, and is constructed so as to terminate in a sharp knife edged circular point (3), which functions by first perforating the fruit's peel in a manner such that permits the pumping action of a moveable peeler cup (6) (a concave and radially cut hemisphere) to force a core section of fruit (C) to enter completely into said filter (F), and since the main body (1) of the filter is of a tubular cylindrical shape and is configured to have a multitude of transverse radial

slits (4) with conical, or V-shaped, format, positioned parallel with respect to each other (5), and which can be spaced and sized variably, dependent on the juice (J) can produce many juice products with varying desired characteristics. The nature and numbers of the multitude of transverse radial slits (4) with conical, or V-shaped, generate greater efficiency and yield in juice extraction, due to a pressure differential between the inside and outside portions of the filter, inducing a "Venturi Effect" which accelerates juice flow from the inside to the outside of the filter, thus promoting greater juice (J) yield and greater productivity by helping to maintain these passageways clear of obstructions and reducing clogging and cleaning frequency.

19. A filter for use in an apparatus for the extraction of fruit juice comprising:

a cylindrical filter body having connected at one end thereof a removable cylindrical perforating cutting edge terminating in a circular point, for perforating the peel of an article of fruit, whereby a moveable concave and radially cut hemisphere of said apparatus forces a core section of said fruit to enter said filter body,

said filter body having a plurality of spaced-apart parallel transverse radial slits therein.

20. The filter of CLAIM 19 wherein said filter body is of nontoxic materials.

5 21. A fruit juice extraction apparatus comprising:
a chassis having mounted thereon juice extraction means;

said juice extraction means having means for storing said fruit, said storing means having a plurality
10 of apertures therein for allowing articles of said fruit to be deposited between at least two pairs of mating radially cut and concave hemispheres, each of said pairs having one movable and one fixed hemisphere;

drive means for actuating means for forcing
15 each of the movable of said concave hemispheres against its mating fixed concave hemisphere, thereby pressing an article of said fruit deposited between said hemispheres;

each of said movable concave hemispheres having a central pin and each of said fixed concave hemispheres
20 having a perforating tube for the extraction of juice from said article of fruit, whereby the solid residue is deposited in a receptacle and the liquid is passed through a filter and then falls into a reservoir which

has outlet ports therein;

5 said filter comprising a cylindrical filter body of
nontoxic materials, having connected at one end thereof
a removable cylindrical perforating cutting edge
terminating in a circular point, for perforating the peel
of said article of fruit, whereby said moveable concave
and radially cut hemisphere forces a core section of said
fruit to enter said filter body, said filter body having
a plurality of spaced-apart parallel transverse radial
10 slits.

22. The apparatus of CLAIM 21, wherein said
transverse slits are of increasing diameter from inside
to outside.

23. A fruit juice extraction apparatus comprising:
15 two fixed peeler cups and two moveable peeler cups
attached to a chassis in mating pairs of fixed and
moveable peeler cups, said cups being concave
hemispheres, each pair being located at opposing ends of
said chassis, where said moveable peeler cups are each
20 attached to opposing ends of a single linear drive
actuator for driving both movable peeler cups in a back
and forth cycle, said moveable peeler cup at each of the
ends of said linear actuator being driven in a manner

such that when one of said peeler cups is opening to allow an article of fruit to fall within its concave chamber formed in conjunction with its mating fixed peeler cup, said moveable peeler cup at the opposing end of said linear actuator is closing upon said fruit inside said chamber formed by the intermeshing of said moveable and fixed peeler cups, and shearing said fruit's skin as it initiates the peeling process and continues to complete the juicing cycle by pumping said fruit's core through a filtering means mounted in said mating fixed peeler cup, said filtering means having a cutting point at its forward opening and radially cut slits to permit said fruit's core to enter completely into said filtering means which allows for the extracted juice to flow through and be collected in juice collection means connected to said fixed peeler cup, followed by the motion of a plunger which travels through said filtering means and pushes directly on said fruit's core until said core is expelled completely from the forward end of said filtering means and, whereby, the dried fruit core of said fruit is forced through said moveable peeler cups, and is directed to further fall through a fruit core receiving means, whereby when said moveable peeler cup is

in the full open position, said apparatus is positioned to commence another fruit juice extraction cycle.

24. The apparatus of CLAIM 23, wherein said pair of peeler cups positioned at one end of said apparatus are
5 180 degrees out of phase with respect to said pair of peeler cups at the opposing end of said apparatus.

25. The apparatus of CLAIM 23, wherein when said moveable peeler cups move back and away from said fixed peeler cups, said linear drive actuator drives said
10 plunger through said filtering means, whereby said fruit's core is expelled completely from the forward end of said filtering means and the dried fruit core falls into and through said chamber formed by said fixed and moveable peeler cups.

26. The apparatus of CLAIM 23, further comprising
15 spray nozzles mounted at selected positions on said chassis.

27. The apparatus of CLAIM 23, channel means is positioned in said moveable peeler cups to direct said
20 fruit forced through said moveable peeler cups to further fall through a fruit core receiving means, said receiving means be angulated downwardly with respect to the said moveable peeler cup within which it is positioned.

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28. A fruit juice extraction apparatus comprising:
a chassis having mounted thereon juice
extraction means;

5 said juice extraction means having means for
storing said fruit, said storing means having a plurality
of apertures therein for allowing articles of said fruit
to be deposited between at least two pairs of mating
concave hemispheres, each of said pairs having one
movable and one fixed hemisphere;

10 drive means for actuating means for forcing
each of the movable of said concave hemispheres against
its mating fixed concave hemisphere, thereby pressing an
article of said fruit deposited between said hemispheres;

15 each of said movable concave hemispheres having
a central pin and each of said fixed concave hemispheres
having a perforating tube for the extraction of juice
from said article of fruit, whereby the solid residue is
deposited in a receptacle and the liquid is passed
through a filter and then falls into a reservoir which
20 has outlet ports therein and the dried fruit core of said
fruit is forced through said moveable peeler cups.

29. The apparatus of CLAIM 28, wherein said
perforating tube has multiple transverse slits of

increasing diameter from inside to outside.

30. The apparatus of CLAIM 28, wherein each of said concave hemispheres having its concave surface defined by a plurality of spaced-apart radial blades.

5 31. The apparatus of CLAIM 30, wherein said radial blades of each of said hemispheres are of at least two different lengths.

10 32. The apparatus of CLAIM 31, wherein when said movable hemisphere is forced against its mating fixed hemisphere, said radial blades of said movable hemisphere are positioned intermediate said radial blades of said fixed hemisphere.

15 33. The apparatus of CLAIM 28, wherein said movable hemispheres are attached to opposing ends of said forcing means for driving both movable hemispheres in a back and forth cycle, said moveable hemispheres at each of the ends of said forcing means being driven in a manner such that when one of said movable hemispheres is opening to allow said article of fruit to fall between it and its
20 mating fixed hemisphere, said moveable hemisphere at the opposing end of said forcing means is closing upon said fruit between it and said other of said fixed hemispheres and shearing said fruit's skin as it initiates the

peeling process and continues to complete the juicing cycle by forcing said fruit's core through its said perforating tube, whereby extracted juice flows to said reservoir.

5 34. The apparatus of CLAIM 33, further comprising a plunger which moves through each of said tubes and expels said fruit's core from the forward end of said tubes and, whereby when one of said moveable hemispheres is in the full open position, said apparatus is
10 positioned to commence another fruit juice extraction cycle.

 35. A fruit juice extraction apparatus comprising:
two sets of moveable peeler cups attached to a chassis in
mating pairs of internal and external moveable peeler
15 cups, said cups being concave hemispheres, each pair being located at opposing ends of said chassis, where said internal moveable peeler cups are each attached to opposing ends of a linear drive actuator for driving both sets of movable peeler cups in a back and forth cycle,
20 said internal moveable peeler cups at each of the ends of said linear actuator being driven in a manner such that when one of said internal peeler cups is opening to allow an article of fruit to fall within its concave chamber

formed in conjunction with its mating external peeler cup, said internal moveable peeler cup at the opposing end of said linear actuator is closing upon said fruit inside said chamber formed by the intermeshing of said internal and external moveable peeler cups, and shearing said fruit's skin as it initiates the peeling process and continues to complete the juicing cycle by pumping said fruit's core through a filtering means mounted in said mating fixed peeler cup, said filtering means having a cutting point at its forward opening and radially cut slits to permit said fruit's core to enter completely into said filtering means which allows for the extracted juice to flow through and be collected in juice collection means connected to said fixed peeler cup, followed by the motion of a plunger which travels through said filtering means and pushes directly on said fruit's core until said core is expelled completely from the forward end of said filtering means and, whereby, the dried fruit core of said fruit is forced through said internal moveable peeler cups, and is directed to further fall through a fruit core receiving means, whereby when said moveable peeler cup is in the full open position, said apparatus is positioned to commence another fruit

juice extraction cycle.

36. The apparatus of CLAIM 35, wherein said pair of peeler cups positioned at one end of said apparatus are 180 degrees out of phase with respect to said pair of peeler cups at the opposing end of said apparatus.

37. The apparatus of CLAIM 35, wherein when said internal moveable peeler cups move back and away from said eternal peeler cups, said linear drive actuator drives said plunger through said filtering means, whereby said fruit's core is expelled completely from the forward end of said filtering means and the dried fruit core falls into and through said chamber formed by said internal and external moveable peeler cups.

38. The apparatus of CLAIM 35, further comprising spray nozzles mounted at selected positions on said chassis.

39. The apparatus of CLAIM 35, channel means is positioned in said internal moveable peeler cups to direct said fruit forced through said internal moveable peeler cups to further fall through a fruit core receiving means, said receiving means be angulated downwardly with respect to the said internal moveable peeler cup within which it is positioned.

40. A fruit juice extraction apparatus comprising:
a chassis having mounted thereon juice
extraction means;

5 said juice extraction means having means for
storing said fruit, said storing means having a plurality
of apertures therein for allowing articles of said fruit
to be deposited between at least two pairs of mating
concave hemispheres, each of said pairs having one
internal movable and one external moveable hemisphere;

10 drive means for actuating means for forcing
each of the internal movable of said concave hemispheres
against its mating external moveable concave hemisphere,
thereby pressing an article of said fruit deposited
between said hemispheres;

15 each of said external movable concave
hemispheres having a central pin and each of said
internal moveable concave hemispheres having a
perforating tube for the extraction of juice from said
article of fruit, whereby the solid residue is deposited
20 in a receptacle and the liquid is passed through a filter
and then falls into a reservoir which has outlet ports
therein and the dried fruit core of said fruit is forced
through said internal moveable peeler cups.

hemisphere at the opposing end of said forcing means is closing upon said fruit between it and said other of said external hemispheres and shearing said fruit's skin as it initiates the peeling process and continues to complete the juicing cycle by forcing said fruit's core through its said perforating tube, whereby extracted juice flows to said reservoir.

46. The apparatus of CLAIM 45, further comprising a plunger which moves through each of said tubes and expels said fruit's core from the forward end of said tubes and, whereby when one of said internal moveable hemispheres is in the full open position, said apparatus is positioned to commence another fruit juice extraction cycle.